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ABSTRACT

The administrative structures that provide graduate neuroscience training at doctorate-granting institutions were studied, along with the number of faculty, research doctorates, graduate students, and postdoctorate trainees in neuroscience programs. Attention was also directed to the opinions of neuroscience experts regarding employment, training, and research in the future. In addition to 181 institutions that are members of the Higher Education Panel, seven nonpanel institutions having doctorate-level neuroscience activity were surveyed. Findings include the following: nearly three-fifths of the 188 institutions awarded Ph.D.s in traditional fields with a specialization in neuroscience; almost one-third offered training through interdepartmental programs, and only 3 percent had departments of neuroscience; just over 3,400 full-time neuroscience faculty were at these schools in fall 1981; postdoctorate trainees increased by five percent from 1980 to 1981, but a decline of two percent was projected from 1981 to 1982; the number of graduate students grew four percent from 1980 to 1981; and the principal areas of neuroscience training and research were physiology, anatomy, and psychology/behavioral sciences. Appendices include the survey results and the questionnaire. (SW)

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NEUROSCIENCE PERSONNEL AND TRAINING

Irene L. Gomberg and Frank J. Atelsek

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AMERICAN COUNCIL ON EDUCATION

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AMERICAN COUNCIL ON EDUCATION

J. W. Peltason, President

The American Council on Education, founded in 1918, is a council of educational organizations and institutions. Its purpose is to advance education and educational methods through comprehensive voluntary and cooperative action on the part of American educational associations, organizations, and institutions.

The Higher Education Panel is a survey research program established by the Council for the purpose of securing policy-related information quickly from representative samples of colleges and universities. *Higher Education Panel Reports* are designed to expedite communication of the Panel's survey findings to policy-makers in government, in the associations, and in educational institutions across the nation.

The Higher Education Panel's surveys on behalf of the Federal Government are conducted under support provided jointly by the National Science Foundation, the National Endowment for the Humanities, and the U.S. Department of Education (NSF Contract SRS-8117037 and NEH Grant OP-20027-81-2233).

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The Higher Education Panel Advisory Committee and the Federal Advisory Board and its Technical Advisory Committee also contributed to this effort.

We are especially appreciative of the efforts of our Panel representatives and the neuroscience coordinators on the participating campuses who made this study possible.

Highlights

- In fall 1981, there were 188 Ph.D.-granting institutions of higher education with neuroscience training programs. Nearly three-fifths offer neuroscience training within traditional departments, where the Ph.D.'s awarded are in traditional fields with a specialization in neuroscience. Almost one-third offer training through interdepartmental programs. Only 3 percent have departments of neuroscience.
- Just over 3,400 full-time neuroscience faculty were at these colleges and universities in fall 1981. Sixty-five percent were at public institutions, and of these, 74 percent were tenured. At private institutions, 57 percent were tenured.
- The number of neuroscience faculty grew 8 percent between fall 1980 and fall 1981, but was expected to increase by only 1 percent between 1981 and 1982. Declines in faculty growth rates for all types of institutions were expected, except for medical schools and the top 50 institutions in terms of research and development expenditures.
- Faculty vacancies in the neurosciences amounted to 4 percent of full-time neuroscience faculty in fall 1981. Fewer than 1 percent of the faculty were expected to retire in 1982-83.
- Postdoctorate trainees increased by 5 percent from 1980 to 1981, but a decline of 2 percent was projected from 1981 to 1982.
- The number of graduate students grew 4 percent from 1980 to 1981, but a very slight decrease was expected between 1981 and 1982.
- In fall 1981, 9 percent of graduate students and 20 percent of postdoctorate trainees in neuroscience programs were foreign citizens.

- The principal areas of neuroscience training and research were physiology anatomy, and psychology/behavioral sciences.
- The number of doctorates awarded in neuroscience programs was 516 in 1980-81 and 490 in 1981-82. In 1982-83, nearly 600 doctorates were expected to be awarded.
- The duration of graduate study in the neurosciences averaged about five years at the majority of institutions. Postdoctorate training periods typically lasted two years.
- Over 40 percent of institutions reported a market balance between postdoctorate trainees and available positions. In contrast, 75 percent of institutions were of the opinion that there was an oversupply of neuroscientists for available full-time employment.

Background

Research and training in neuroscience has burgeoned over the past decade, involving scientists from disciplines as diverse as physiology, psychology, biochemistry, and genetics. Because of the interdisciplinary nature of the neuroscience field, it has been nearly impossible to assess accurately the growth of its capabilities and needs.

It is widely recognized that the number of scientists working in the field has increased, as has the number of formal training programs. However, a quantitative assessment of the current status of the neuroscience field is critical if federal policy is to stay abreast of its growth and needs for further development.

A first step in this direction was the formation in July, 1981, of the federal Interagency Working Group in Neuroscience to exchange perspectives on federal support of neuroscience research and training. Because of the dearth of available information about the personnel and training in the neurosciences, the National Science Foundation proposed the present survey. Its objectives were: (1) to clarify the nature of the administrative structures that provide graduate neuroscience training at doctorate-granting institutions; (2) to determine the number of faculty, research doctorates, graduate students, and postdoctorate trainees in neuroscience programs for a recent three-year period; and, (3) to obtain the opinions of neuroscience experts regarding changes in manpower and training, the areas of concentration in training and research, and the market for postdoctorate training and employment in neuroscience.

Methods Summary

The Higher Education Panel forms the basis of a continuing survey research program created in 1971 by the American Council on Education. Its purpose is to conduct surveys on topics of current policy interest to the higher education community and to government agencies.

The Panel is a disproportionate stratified sample of 760 colleges and universities drawn from the population of more than 3,000 institutions listed in the National Center for Education Statistics' Education Directory. All institutions in the population are grouped according to the Panel's stratification design, which is based upon institution type (university, four-year college, two-year college), control (public, private), and size (full-time-equivalent enrollment). For any given survey, either the entire Panel or an appropriate subgroup is used.

The survey operation is dependent upon a network of campus representatives at the Panel institutions that (through their presidents) have agreed to participate. The representatives receive the Panel questionnaires and direct them to the most appropriate campus officials for response.

A field test of the survey instrument was conducted in mid-March 1982. Panel representatives on selected campuses were asked to provide their comments and suggestions, and prospective respondents were asked to complete the survey fully and note any problem areas. The questionnaire was revised accordingly.

The final survey instrument (see Appendix A) was mailed on June 21, 1982, to the Ph.D.-granting institutions in the Panel which were thought to offer neuroscience programs. Through information from the National Science Foundation, and through institutional self-reporting, a total of 181 eligible Panel institutions ultimately were identified as offering doctorate-level programs in the neurosciences. Further, though not members of the Panel, seven other

institutions in the population were identified as having neuroscience activity and were included in the study at the request of the sponsor. Thus, this was a population, rather than a sample, survey.

Along with the survey instructions, most Panel representatives were given the names of specific neuroscience "coordinators" recommended by the sponsor to direct the survey effort on their campuses. Where no particular coordinator was recommended, the Panel representative selected the most appropriate respondent. The involvement of someone in addition to the campus representative is unusual for a Panel survey; however, it was considered particularly valuable in view of the interdisciplinary, interdepartmental nature of neuroscience activity.

By the October 25 close of the field phase, after mail and telephone follow-up efforts, usable data had been received from 174 institutions, for a response rate of 93 percent. Data from responding institutions were statistically adjusted to represent the national population of 188 colleges and universities with doctorate-level programs in the neurosciences. Institutional weights were computed separately for each stratum, based upon the ratio of the number of institutions in the population to the number of institutions that responded.

Appendix B presents the stratification design used to produce the national estimates, and a comparison of respondents and nonrespondents according to various institutional characteristics.

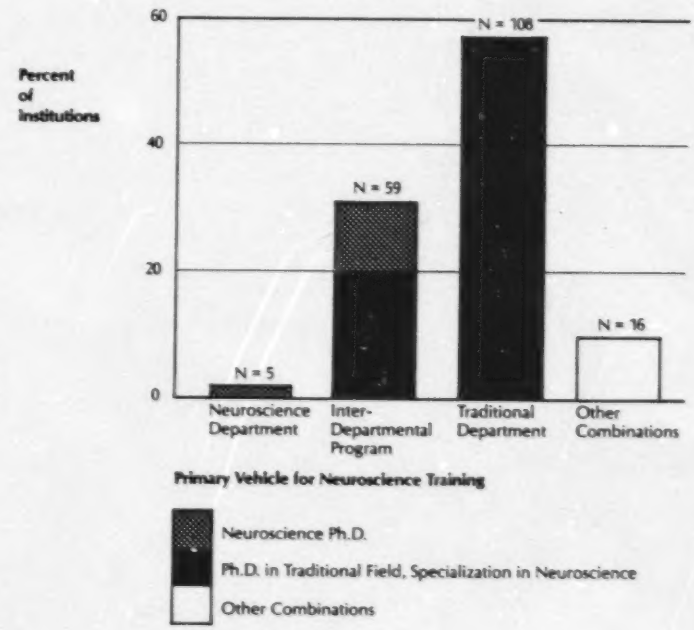
Findings

Survey respondents were asked to provide basic information about their institutions' neuroscience programs: the type of organizational structure, the numbers of students and faculty involved in training and research, major areas of concentration, and opinions of the market for neuroscientists.

Administrative Structure

Training programs in the neurosciences presently exist in 188 Ph.D.-granting institutions. The administrative structures of these programs offer some insight into the complexity of neuroscience as a discipline. As shown in figure 1, only five institutions have as their primary neuroscience training program a separate, independent department offering a Ph.D. in neuroscience.

FIGURE 1
Organization of Primary Neuroscience Training Programs in All Institutions, 1981-82



Six of every 10 institutions offer neuroscience training through a traditional department, and 3 of every 10 offer such training through an interdepartmental program. It is interesting to note that in most cases (77 percent), the doctorate is awarded in a traditional discipline with a specialization in neuroscience. The Ph.D. is awarded specifically in neuroscience only within the freestanding departments of neuroscience and within one of every three interdepartmental programs.

More than one-fourth of all institutions reported offering additional neuroscience training programs distinct from the ones they regarded as primary (see detailed tables 4 and 5).

The ties to traditional departments in neuroscience training overall are quite strong. They are strongest in institutions that have only graduate school programs (with 63 percent of primary training occurring in traditional departments), and less strong in comprehensive institutions--those that offer both medical school and graduate school training (48 percent; figure 2).[1] Also, freestanding neuroscience departments occur only in comprehensive institutions.

Among the top 20 institutions ranked according to federally funded R & D expenditures in the biological sciences (1980), an interesting shift occurs: interdepartmental programs provide the greatest share of primary neuroscience training (55 percent), with traditional departments accounting for only 25 percent.

The Faculty and Staff

The survey obtained information about the characteristics of the full-time faculty participating in neuroscience programs, including their number, tenure status, position vacancies, and expected retirements.

Overall, as of fall 1981, the full-time faculty numbered more than 3,400 persons, with almost two of every three affiliated with neuroscience programs at public institutions (figure 3). Tenure status had been achieved by 68 percent of all faculty, with the proportion tenured much higher at public institutions (74 percent) than at private institutions (57 percent).

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[1]Three different types of institutions are referred to throughout this report: (1) "graduate school only," institutions that offer graduate but not medical school training; (2) "medical school only," institutions that offer medical but not graduate school training; and (3) "comprehensive," institutions that offer both graduate and medical school training.

FIGURE 2
Organization of Primary Neuroscience Training Programs by Type of Institution, 1981-82

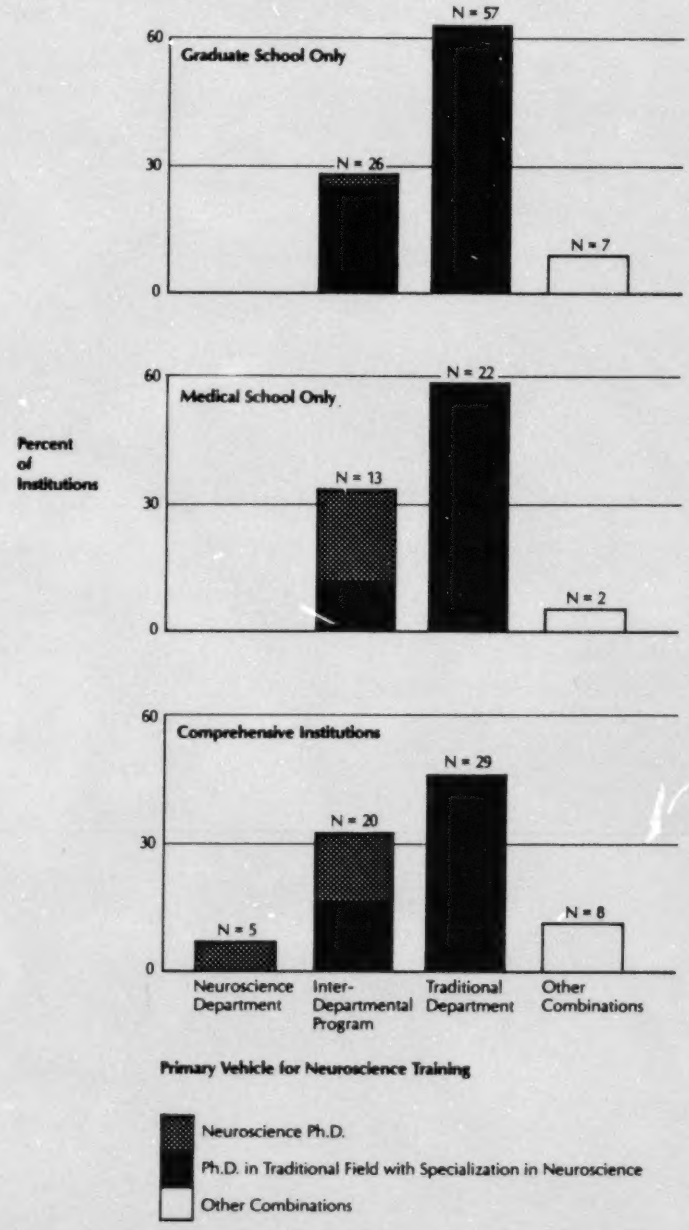
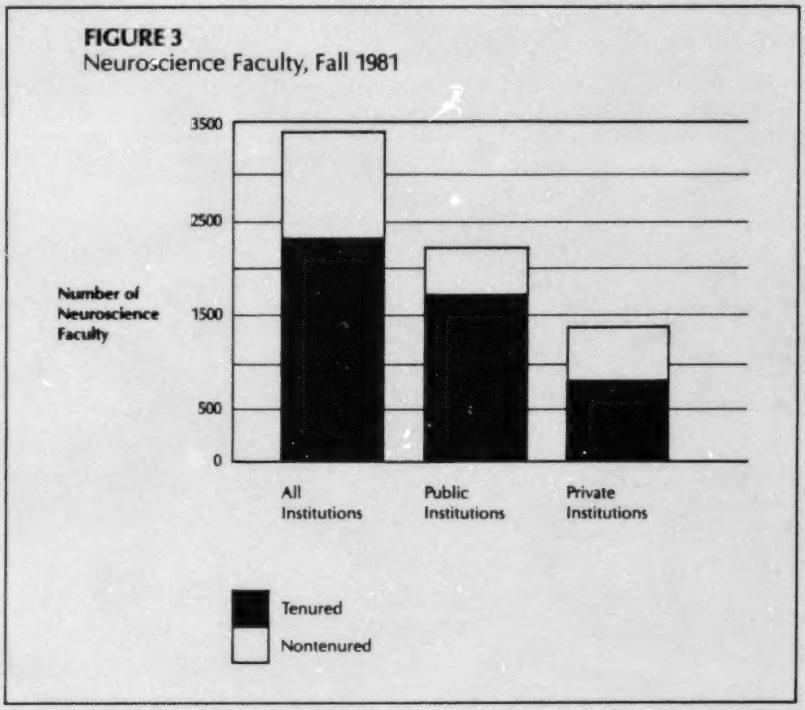


FIGURE 3
Neuroscience Faculty, Fall 1981



Vacancies among full-time neuroscience faculty totaled only 4 percent in fall 1981 (141 faculty positions). The vacancy rate did not differ greatly by control or type of institution, or by extent of research and development funding (table A). Faculty turnover due to retirement was expected also to be minimal. Thirty-two retirements were expected in academic year 1982-83, or about 1 percent of the faculty pool. As projected by the survey respondents, retirements from medical school neuroscience programs were to be especially few (only 3 of the 762 faculty members).

In fall 1981, almost 400 nonfaculty research doctorates were working in the neuroscience programs, exclusive of postdoctorate trainees. They were outnumbered by full-time faculty members by about 9 to 1. Table B summarizes the distribution of the research doctorate staff relative to the faculty in neuroscience programs.

Table A

Neuroscience Faculty Vacancies and Expected Retirements

	Vacancies (Fall 1981)	Expected Retirements (AY 1982-83)
Total number	141	32
As a percent of total faculty	4	1
By control		
Public	4	1
Private	5	1
By type		
Graduate school only	5	1
Medical school only	5	*
Comprehensive	4	1
By R & D funding		
Top 50	3	1
All others	5	1

*Less than .5 percent.

Table B

Faculty per Nonfaculty Research Doctorate, Fall 1981

	Ratio
Total	9
Control	
Public	9
Private	7
Type	
Graduate school only	8
Medical school only	12
Comprehensive	8
R & D funding	
Top 50	7
All others	10

Changes in Staff Size and Enrollments

Data were gathered about the numbers of neuroscience faculty, post-doctorate trainees, and graduate students for fall 1980 and fall 1981, and estimates were asked for fall 1982. The results for the 188 institutions are summarized in table C.

Faculty. The data suggest that the growth in faculty observed during the the 1970s may be slowing. In the classifications shown in table C, the changes in faculty levels expected for AY1981-82 were lower than for the previous academic year in all but the medical school programs. The top 50 institutions maintained only a 2 percent growth rate, while the medical schools maintained their faculty growth at 4 percent.

Table C

Rate of Change in Neuroscience Faculty and Postdoctorate Trainee Staffing and Graduate Enrollment, 1980-82
(in percentages)

	Faculty		Postdoctorate Trainees		Graduate Students	
	1980-81	1981-82	1980-81	1981-82	1980-81	1981-82
All institutions	8	1	5	-2	4	-*
Control						
Public	8	3	6	-2	5	-1
Private	8	-2	4	-2	4	1
Type						
Graduate school only	8	3	8	-*	9	2
Medical school only	4	4	3	4	6	-6
Comprehensive	10	-1	5	-4	-*	-2
R & D funding						
Top 50	2	2	1	-1	1	*
All others	13	1	14	-3	7	-1

*Less than .5 percent.

Postdoctorate Trainees. The changes in the number of postdoctorate trainees expected by the respondents more consistently pointed toward actual declines. Declines were expected in both the public and private sectors, among the top 50 in R & D funding, and among neuroscience programs in both graduate schools and comprehensive institutions. The single exception was among medical school programs, which increased its growth from 3 percent between 1980 and 1981 to 4 percent between 1981 and 1982.

Graduate Students. Slower growth rates and an overall decline in total numbers were expected also for graduate students in the neurosciences. In all categories of institutions, as shown in table C, the numbers of graduate students were expected either to decline in 1982 or to increase at a rate below the 1980-81 interval.

Faculty-to-Trainee Ratios. The ratios of faculty to postdoctorate trainees and graduate students as of fall 1981 are shown in table D. The ratio overall was 110 trainees and students per 100 faculty, evidence of a very faculty-intensive program. There were some differences among kinds of institutions. Graduate schools had the highest ratios--160 postdoctorate trainees and graduate students per 100 faculty members--and medical schools had the lowest--80 trainees and graduate students per 100 faculty members. In addition, the ratios are higher (more trainees and graduate students per 100 faculty members) in programs at public than at private institutions, and among institutions in the top 20 and top 50 by federal R & D funding for biological research.

While these ratios are more complex than they might appear initially, they do reflect the nature of neuroscience, the influence of medical school training, and the need for considerable student-faculty interaction.

Table D

Postdoctorate Trainees and Graduate Students per 100 Faculty Members, Fall 1981

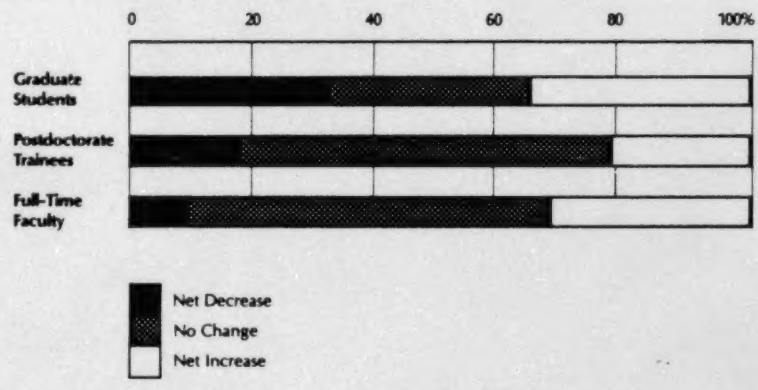
	Trainees and Students Per 100 Faculty
Total	110
Control	
Public	120
Private	100
Type	
Graduate school only	160
Medical school only	80
Comprehensive	100
R & D funding	
Top 20	130
Top 50	130
All others	100

Net Change Among Institutions

The institutions themselves offer another perspective of the changes occurring in neuroscience training. As shown in figure 4, more institutions reported net changes in graduate student enrollment than for faculty or postdoctorate trainees between 1980 and 1982. Roughly a third of the institutions reported net increases for graduate students; a third, net decreases; and a third, no change. In contrast, about three of every five institutions reported no net change in numbers of postdoctorate trainees or full-time faculty during the same period. Among institutions that did report changes in faculty counts, the net increases outstripped net decreases by more than three to one.

Primary Factors Associated with Net Changes. Table E lists the factors most frequently cited by the respondents to explain net changes in the number

FIGURE 4
Changes in Neuroscience Students, Trainees and Faculty Between Fall 1980 and Fall 1982



of graduate students, postdoctorate trainees, and faculty over the 1980-82 period.

The impact of recent changes in federal support levels is especially apparent. Insufficient federal support for training or research was mentioned as one of the primary factors responsible for decreasing numbers of graduate students and postdoctorate trainees, as well as faculty. Federal support of both training and research were also predominant factors cited by the institutions that reported increases in postdoctorate trainees.

Foreign Graduate Students and Postdoctorate Trainees

Another area of inquiry concerned the extent to which foreign citizens on temporary or student visas participate in the neuroscience programs as graduate students or postdoctorate trainees. Among all institutions, foreign citizens made up 9 percent of the graduate students and 20 percent of the postdoctorate trainees in the neuroscience programs in fall 1981. Foreign students and trainees were fairly evenly distributed among the different program and institution types (see detailed table 19).

Table E

Most Frequently Cited Primary Factors
to Explain Net Changes, 1980-1982

Net increase in:	Primary Factor	Percentage of Institutions Citing Factor
Graduate students	Number of applicants	25
	Professional interest	23
Postdoctorate trainees	Federal training grants and fellowships	25
	Federal research grants and contracts	22
Faculty	Professional interest	29
	Institutional/state support	29
Net decrease in:		
Graduate students	Number of applicants	26
	Federal training grants and fellowships	23
Postdoctorate trainees	Federal training grants and fellowships	33
	Federal research grants and contracts	33
Faculty	Federal research grants and contracts	12

Principal Areas of Concentration Since 1977

Louise Marshall of the Brain Research Institute, University of California at Los Angeles, analyzed data on new doctorates and research conducted in the neurosciences during the mid-seventies. She noted a concentration then in the behavioral sciences, physiology, and biology, with anatomy, biophysics, pharmacology, and biochemistry each accounting for somewhat smaller proportions of the activity in the neurosciences (Marshall, 1979; see table F).

Table F

Percentage Distributions of New Doctorates and Research Specialization in Neuroscience, by Discipline

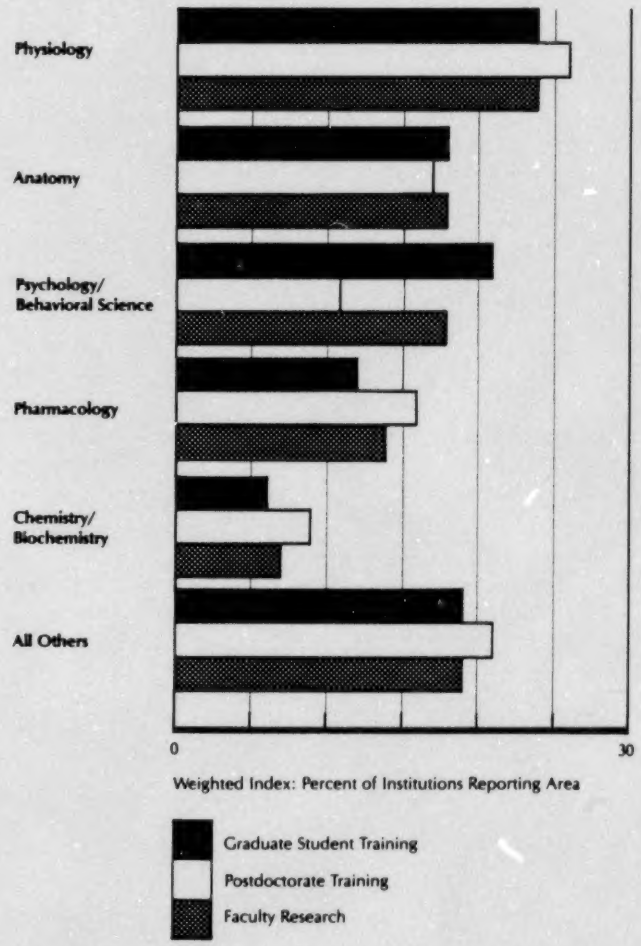
Discipline	New Doctorates 1974 (N=396)	New Doctorates 1976 (N=520)	Research 1974	Research 1976
Behavioral sciences	27	21	19	23
Physiology	21	18	19	29
Biology	7	20	11	10
Anatomy	13	9	10	6
Pharmacology	11	9	10	8
Biophysics/engineering	7	9	5	4
Biochemistry	7	5	13	9
Other health sciences	4	4	9	7
Communicative sciences	1	5	4	5

Source: Louise H. Marshall, "Maturation and Current Status of Neuroscience: Data from the 1976 Inventory of U.S. Neurologists," Experimental Neurology, Vol. 64, 1-32 (New York City: Academy Press, Inc., 1979).

Although not strictly comparable with data from Marshall's analysis, responses to the present survey show a very similar profile of neuroscience activity. A weighted aggregation[2] of the principal areas of concentration is shown in figure 5. These data show that the relative emphases are quite similar for graduate student training and postdoctorate training and research, as well as for faculty research--with the exception of psychology/behavioral science, which is less well represented in postdoctorate training and research. In all three sets of activity, physiology was the leading field, closely followed by anatomy and psychology/behavioral science.

[2]Respondents were asked to rank order the three top areas of concentration in training and research separately for graduate students, postdoctorate trainees, and faculty. For each group the first ranked area was assigned a weight of 3, the second ranked a weight of 2, and the third ranked a weight of 1. The weights then were summed for each area of concentration. The percentage distributions of the weighted results are detailed in tables 20-23.

FIGURE 5
Areas of Concentration in Neuroscience Training and Research Since 1977



Pharmacology and chemistry/biochemistry were in the next position in both training and research activity. None of the other ten areas listed in the survey accounted for more than 4 percent of the neuroscience activity. The detailed tables at the end of this report show how the areas of concentration differ among the various institutional settings and types of programs (see detailed tables 20-23).

Other Recent Changes in Neuroscience Training

Survey respondents also provided data about current and near-term Ph.D. production and changes in the typical duration of graduate study and post-doctorate training periods.

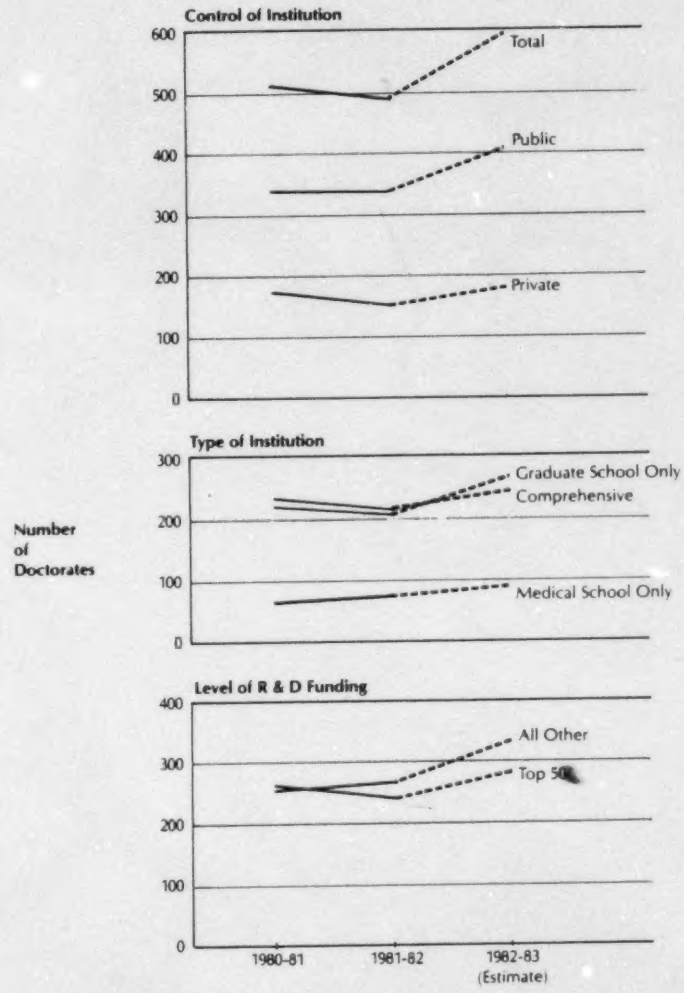
Numbers of Ph.D. Recipients. Changes in Ph.D. degree production between AY 1980-81 and AY 1982-83 are depicted in figure 6. Overall, the number of new doctorates declined (from 516 to 490) between 1981 and 1982, but the respondents projected a substantial gain in Ph.D. production for 1982-83 (to almost 600)--a 22 percent increase overall. One probably should be wary of the latter figure as an accurate projection. To produce these estimates, respondents were likely to consider all the Ph.D. candidates who could (or should) complete their doctoral work during the upcoming year. However, in Ph.D. programs, students' plans often go awry, and thus near-term projections generally tend to be on the high rather than the low side. Moreover, since the number per institution is small, an increase from 2 to 3 degree recipients is a 50 percent increase.

Duration of Study and Training

Typically, full-time students in the neurosciences completed their graduate studies in four or five years (figure 7). Most institutions (63 percent) reported five years was the norm, and 28 percent reported four years as typical. Only a few institutions (7 percent) listed six or more years, and fewer still reported that the typical length of study was three years or less.

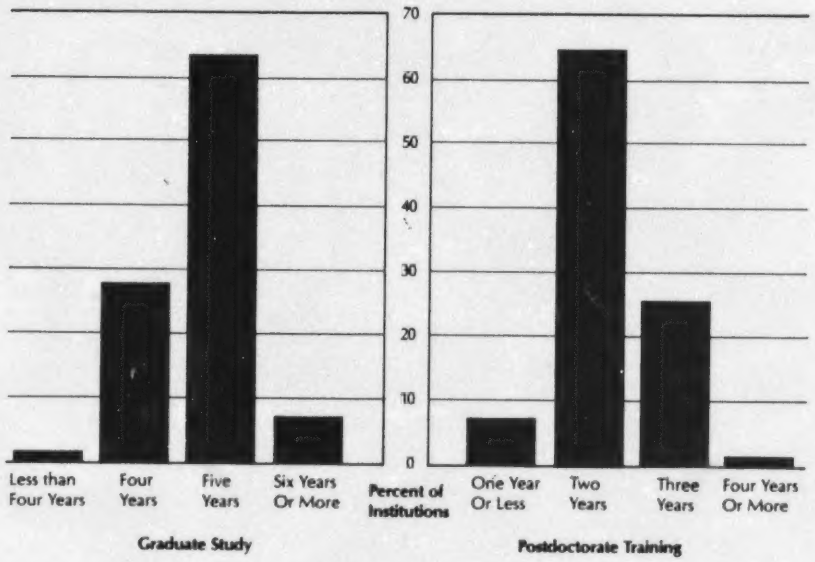
Postdoctorate training tended to be of considerably shorter duration than graduate study--two years at two-thirds of the institutions and three years at most of the rest (26 percent). In a few instances--9 of the 124 institutions that had postdoctorate appointments since 1977--the training programs were held to one year or less.

FIGURE 6
New Doctorates in the Neurosciences in AY 1980-81, 1981-82, and Estimates for AY 1982-83



Typical study periods have not changed at most institutions during the five years since 1977 (table 26). Where changes have occurred, study/training periods were shortened at only a few institutions (graduate study at 3 percent; postdoctorate training at 5 percent). In contrast, 11 percent of the institutions indicated increases in the typical length of graduate study and 24 percent reported such increases for postdoctorate training. The most frequently cited factor associated with lengthening the graduate study period was

FIGURE 7
Typical Length of Graduate Study and Postdoctorate Training in the Neurosciences.



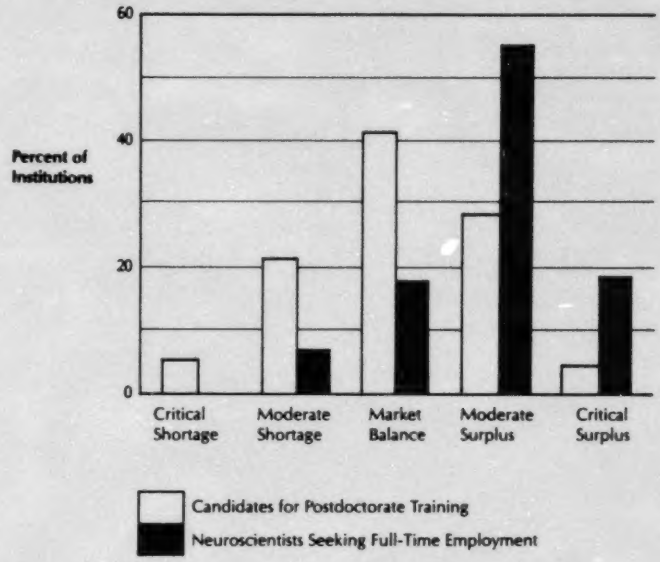
the lack of postdoctorate training opportunities (33 percent); the lack of full-time jobs in the field was cited as the major factor in extending the postdoctorate training period (69 percent).

Assessment of Postdoctorate Training and Employment Opportunities

Based on their recent placement experiences, respondents were asked to characterize the market during 1981-82 for postdoctorate training and full-time employment in neuroscience (figure 8). The assessments of postdoctorate training opportunities were normally distributed, with a plurality of respondents referring to a well-balanced market (41 percent). Twenty-six percent cited personnel shortages and 33 percent, personnel surpluses.

Opinions about employment opportunities were less balanced. Seventy-five percent believed there were more people than jobs in neuroscience, including one-fifth who thought the surplus was of a critical dimension. Only 18 percent

FIGURE 8
Assessments of Training and Employment Markets in Neuroscience
AY 1981-82



of the institutions considered the market in balance, and just 7 percent saw a moderate shortage of neuroscientists ready for full-time employment.

Summary

Earlier studies document the rapid growth of the neurosciences over the past decade. Data from the present survey suggest a gradual slow-down of an apparently maturing field of study that is not subject to the setting of strict boundaries that characterize many other established disciplines. The neurosciences seem likely to maintain a strongly interdisciplinary character. Judging from the many different areas of concentration cited by the respondents to this survey, the neurosciences are not much driven by the need to consolidate. The organization of training and research shows that the neurosciences continue to draw from a broad range of fields and are likely to remain closely associ-

ated with them. Six of every 10 primary training programs are offered through traditional departments, and 3 of every 10 are interdepartmental.

Evidence of a potential slowed growth in the field comes from tracking the people involved. There were 3,400 faculty teaching in the neurosciences as of fall 1981. Their numbers had grown moderately from the previous year but were expected to increase only slightly by the next year.

Moreover, postdoctorate trainees and graduate students experienced low to moderate growth between 1980 and 1981, but were anticipating declines between 1981 and 1982. Oddly enough, although the number of doctorate recipients dipped slightly between 1981 and 1982, respondents expected a sizable increase to 600 Ph.D.s in 1983.

According to two-fifths of the survey institutions, the market for postdoctorate trainees and positions is in balance. The remaining institutions were fairly evenly split between the view that there was a personnel surplus and the view that there was a personnel shortage. With respect to full-time employment of neuroscientists, however, three-quarters of the institutions felt there already was a personnel surplus.

Detailed Statistical Tables

Table 1

Organization of Primary Neuroscience Training Programs at Ph.D.-Granting Institutions, AY 1981-82, by Control of Institution

(in percentages)

Primary Training Program	Total	Public	Private
Department of neuroscience, Ph.D. in neuroscience	3	2	5
Interdepartmental program, Ph.D. in neuroscience	11	13	8
Interdepartmental program, Ph.D. in traditional discipline with specialization in neuroscience	20	22	17
Traditional department, Ph.D. in traditional discipline with specialization in neuroscience	57	57	58
Other	9	7	11
Total percent	100	100	100
(Total number)	(N=188)	(N=125)	(N=63)

Note: On this and following tables, numbers may not add exactly to totals because of weighting and rounding.

Table 2

Organization of Primary Neuroscience Training Programs
at Ph.D.-Granting Institutions, AY 1981-82,
by Type of Institution

(in percentages)

Primary Training Program	Graduate School Only	Medical School Only	Comprehensive
Department of neuroscience, Ph.D. in neuroscience	0	0	8
Interdepartmental program, Ph.D. in neuroscience	2	24	16
Interdepartmental program, Ph.D. in traditional discipline with specialization in neuroscience	27	11	16
Traditional department, Ph.D. in traditional discipline with specialization in neuroscience	63	59	48
Other	8	5	11
Total percent	100	100	100
(Total number)	(N=90)	(N=37)	(N=61)

Table 3

Organization of Primary Neuroscience Training Programs
at Ph.D.-Granting Institutions, AY 1981-82,
by Federally Financed R & D Expenditures in the Biological Sciences in 1980

(in percentages)

Primary Training Program	Top 20	Next 30	Top 50	All Other
Department of neuroscience, Ph.D. in neuroscience	10	3	6	1
Interdepartmental program, Ph.D. in neuroscience	55	7	26	6
Interdepartmental program, Ph.D. in traditional discipline with specialization in neuroscience	0	27	16	22
Traditional department, Ph.D. in traditional discipline with specialization in neuroscience	25	53	42	63
Other	10	10	10	8
Total percent	100	100	100	100
(Total number)	(N=20)	(N=30)	(N=50)	(N=138)

Table 4

Percentage Distribution of Additional Neuroscience Training Programs at Ph.D.-Granting Institutions, AY 1981-82 by Control of Institution

Organization of Primary Training Program	Number	Total Percent	No Additional Programs	One Additional Program	More Than One Additional Program
			Total		
Department of neuroscience	5	100	40	40	20
Interdepartmental program, neuroscience Ph.D.	21	100	48	48	5
Interdepartmental program, traditional Ph.D.	38	100	71	29	0
Traditional program	108	100	75	23	2
Other	16	100	94	6	0
			Public		
Department of neuroscience	2	100	100	0	0
Interdepartmental program, neuroscience Ph.D.	16	100	44	56	0
Interdepartmental program, traditional Ph.D.	27	100	70	30	0
Traditional program	71	100	75	24	1
Other	9	100	89	11	0
			Private		
Department of neuroscience	3	100	0	67	33
Interdepartmental program, neuroscience Ph.D.	5	100	60	20	20
Interdepartmental program, traditional Ph.D.	11	100	73	27	0
Traditional program	37	100	76	22	3
Other	7	100	100	0	0

Table 5

Percentage Distribution of Additional Neuroscience Training Programs at Ph.D.-Granting Institutions, AY 1981-82 by Type of Institution

Organization of Primary Training Program	Number	Total Percent	No Additional Programs	One Additional Program	More than One Additional Program
Graduate School Only					
Department of neuroscience	0	---	0	0	0
Interdepartmental program, neuroscience Ph.D.	2	100	50	50	0
Interdepartmental program, traditional Ph.D.	24	100	71	29	0
Traditional program	57	100	82	18	0
Other	7	100	100	0	0
Medical School Only					
Department of neuroscience	0	---	0	0	0
Interdepartmental program, neuroscience Ph.D.	9	100	44	56	0
Interdepartmental program, traditional Ph.D.	4	100	75	25	0
Traditional program	22	100	64	36	0
Other	2	100	100	0	0
Comprehensive					
Department of neuroscience	5	100	40	40	20
Interdepartmental program, neuroscience Ph.D.	10	100	50	40	10
Interdepartmental program, traditional Ph.D.	10	100	70	30	0
Traditional program	29	100	69	24	7
Other	7	100	86	14	0

Table 6

Full-Time Faculty and Nonfaculty Research Doctorates
in Neuroscience Programs, Fall 1981,
by Control of Institution

Characteristic	Total		Public		Private	
	N	%	N	%	N	%
Total faculty	3,421	100	2,212	100	1,209	100
(Tenured)	2,340	68	1,648	74	692	57
(Nontenured)	1,081	32	565	26	516	43
Nonfaculty research doctorates	396	--	233	--	163	--
Faculty vacancies	141	--	85	--	56	--
As a percent of total faculty	--	4	--	4	--	5
Faculty retirements expected in 1982-83	32	--	17	--	15	--
As a percent of total faculty	--	1	--	1	--	1

Table 7

Full-Time Faculty and Nonfaculty Research Doctorates
in Neuroscience Programs, Fall 1981,
by Type of Institution

Characteristic	Graduate School Only		Medical School Only		Comprehensive	
	N	%	N	%	N	%
Total faculty	908	100	762	100	1,752	100
(Tenured)	654	72	475	62	1,211	69
(Nontenured)	254	28	287	38	540	31
Nonfaculty research doctorates	120	--	61	--	215	--
Faculty vacancies	44	--	37	--	61	--
As a percent of total faculty	--	5	--	5	--	4
Faculty retirements expected in 1982-83	11	--	3	--	18	--
As a percent of total faculty	--	1	--	*	--	1

*Less than .5 percent.

Table 8

Full-Time Faculty and Nonfaculty Research Doctorates
in Neuroscience Programs, Fall 1981,
by Federally Funded R & D Expenditures in the Biological Sciences in 1980

Characteristic	Top 50		All Other	
	N	%	N	%
Total faculty	1,570	100	1,873	100
(Tenured)	1,114	71	1,240	66
(Nontenured)	456	29	632	34
Nonfaculty research doctorates	213	--	190	--
Faculty vacancies	52	--	90	--
As a percent of total faculty	--	3	--	5
Faculty retirements expected in 1982-83	15	--	17	--
As a percent of total faculty	--	1	--	1

Note: Data from the top 50 and all other institutions were weighted separately and therefore may not add exactly to the total for all institutions.

Table 9

Full-Time Faculty and Nonfaculty Research Doctorates
in Neuroscience Programs, Fall 1981,
by Organization of Primary Neuroscience Training Program

Characteristic	Type A		Type B		Type C		Type D		Type E	
	N	%	N	%	N	%	N	%	N	%
Total faculty	99	100	757	100	713	100	1,612	100	241	100
(Tenured)	46	46	540	71	483	68	1,121	70	145	60
(Nontenured)	53	54	217	29	225	32	491	30	96	40
Nonfaculty research doctorates	16	--	81	--	85	--	181	--	33	--
Faculty vacancies	3	--	33	--	33	--	65	--	7	--
As a percent of total faculty	--	3	--	4	--	5	--	4	--	3
Faculty retirements expected in 1982-83	1	--	4	--	4	--	21	--	1	--
As a percent of total faculty	--	1	--	1	--	1	--	1	--	*

Type A: Department of neuroscience, Ph.D in neuroscience
Type B: Interdepartmental program, Ph.D in neuroscience
Type C: Interdepartmental program, Ph.D in traditional discipline with specialization in neuroscience
Type D: Traditional department, Ph.D in traditional discipline with specialization in neuroscience
Type E: Other

*Less than .5 percent.

Table 10

Graduate Students, Postdoctorate Trainees, and Faculty in Neuroscience Programs, by Control of Institution

Item	Number			Percent Change		
	Fall 1980	Fall 1981	Fall 1982	1980-81	1981-82	1980-82
Total						
Graduate students	2,463	2,574	2,566	4	-*	4
Postdoctorate trainees	1,226	1,292	1,269	5	-2	4
Faculty	3,172	3,421	3,469	8	1	9
Public						
Graduate students	1,769	1,855	1,837	5	-1	4
Postdoctorate trainees	785	834	821	6	-2	5
Faculty	2,056	2,212	2,285	8	3	11
Private						
Graduate students	695	719	729	4	1	5
Postdoctorate trainees	441	457	448	4	-2	2
Faculty	1,116	1,209	1,184	8	-2	6

*Less than .5 percent

Table 11

Graduate Students, Postdoctorate Trainees, and Faculty in Neuroscience Programs, by Type of Institution

Item	Number			Percent Change		
	Fall 1980	Fall 1981	Fall 1982	1980-81	1981-82	1980-82
Graduate School Only						
Graduate students	1,122	1,219	1,244	9	2	11
Postdoctorate trainees	221	239	238	8	-*	8
Faculty	843	908	933	8	3	11
Medical School Only						
Graduate students	294	313	295	6	-6	*
Postdoctorate trainees	289	298	309	3	4	7
Faculty	736	762	795	4	4	8
Comprehensive						
Graduate students	1,047	1,043	1,027	-*	-2	-2
Postdoctorate trainees	716	754	722	5	-4	1
Faculty	1,593	1,752	1,741	10	-1	9

*Less than .5 percent.

Table 12

Graduate Students, Postdoctorate Trainees, and Faculty in Neuroscience Programs, by Federally Financed R & D Expenditures in the Biological Sciences in 1980

Item	Number			Percent Change		
	Fall 1980	Fall 1981	Fall 1982	1980-81	1981-82	1980-82
Top 20						
Graduate students	541	526	521	-3	-1	-4
Postdoctorate trainees	551	554	550	1	-1	-*
Faculty	806	818	832	2	2	3
Next 30						
Graduate students	582	610	617	5	1	6
Postdoctorate trainees	291	295	289	1	-2	-1
Faculty	730	753	774	3	3	6
Top 50						
Graduate students	1,123	1,137	1,138	1	*	1
Postdoctorate trainees	842	849	839	1	-1	-*
Faculty	1,535	1,570	1,605	2	2	5
All Other						
Graduate students	1,370	1,470	1,462	7	-1	7
Postdoctorate trainees	394	451	437	14	-3	11
Faculty	1,661	1,873	1,887	13	1	14

Note: Data from the top 50 and all other institutions were weighted separately and therefore may not add exactly to the total for all institutions.

*Less than .5 percent

Table 13

Graduate Students, Postdoctorate Trainees, and Faculty in Neuroscience Programs, by Organization of Primary Neuroscience Training Program

Item	Number			Percent Change		
	Fall 1980	Fall 1981	Fall 1982	1980-81	1981-82	1980-82
Type A						
Graduate students	86	83	87	-4	5	1
Postdoctorate trainees	28	38	35	36	-8	25
Faculty	86	99	101	15	2	17
Type B						
Graduate students	427	421	419	-1	-1	-2
Postdoctorate trainees	468	469	473	*	1	1
Faculty	741	757	785	2	4	6
Type C						
Graduate students	555	641	642	16	*	16
Postdoctorate trainees	139	145	150	4	3	8
Faculty	602	713	725	18	2	20
Type D						
Graduate students	1,240	1,280	1,272	3	-1	3
Postdoctorate trainees	514	568	541	10	-5	5
Faculty	1,534	1,612	1,615	5	*	5
Type E						
Graduate students	155	149	146	-4	-2	-6
Postdoctorate trainees	76	71	71	-7	0	-7
Faculty	210	241	243	15	1	16

Type A: Department of neuroscience, Ph.D. in neuroscience
Type B: Interdepartmental program, Ph.D. in neuroscience
Type C: Interdepartmental program, Ph.D. in traditional discipline with specialization in neuroscience
Type D: Traditional department, Ph.D. in traditional discipline with specialization in neuroscience
Type E: Other

*Less than .5 percent

Table 14

Percentage Distribution of Institutions Reporting Changes in Numbers of Graduate Students, Postdoctorate Trainees, and Faculty Between Fall 1980 and Fall 1982 by Control of Institution

Item	Total Percent	No Change	Net Increase	Net Decrease
		Total (N=188)		
Graduate students	100	32	35	33
Postdoctorate trainees	100	61	21	18
Faculty	100	60	31	9
		Public (N=125)		
Graduate students	100	30	34	36
Postdoctorate trainees	100	62	22	16
Faculty	100	60	32	8
		Private (N=63)		
Graduate students	100	40	33	27
Postdoctorate trainees	100	60	19	21
Faculty	100	57	32	11

Table 15

Percentage Distribution of Institutions Reporting Changes in Numbers of Graduate Students, Postdoctorate Trainees, and Faculty Between Fall 1980 and Fall 1982 by Type of Institution

Item	Total Percent	No Change	Net Increase	Net Decrease
Graduate School Only (N=90)				
Graduate students	100	32	38	30
Postdoctorate trainees	100	73	17	10
Faculty	100	61	30	9
Medical School Only (N=37)				
Graduate students	100	38	30	32
Postdoctorate trainees	100	43	32	24
Faculty	100	54	35	11
Comprehensive (N=61)				
Graduate students	100	31	31	38
Postdoctorate trainees	100	57	20	23
Faculty	100	59	33	8

Table 16

Percentage Distribution of Institutions Reporting Changes in Numbers of Graduate Students, Postdoctorate Trainees, and Faculty Between Fall 1980 and Fall 1982 by Federally Funded R & D Expenditures in the Biological Sciences in 1980

Item	Total Percent	No Change	Net Increase	Net Decrease
		Top 20		
Graduate students	100	30	25	45
Postdoctorate trainees	100	45	25	30
Faculty	100	60	25	15
		Next 30		
Graduate students	100	50	23	27
Postdoctorate trainees	100	57	23	20
Faculty	100	60	37	3
		Top 50		
Graduate students	100	42	24	34
Postdoctorate trainees	100	52	24	24
Faculty	100	60	32	8
		All Other (N=138)		
Graduate students	100	30	38	33
Postdoctorate trainees	100	65	20	15
Faculty	100	59	32	9

Table 17

Percentage Distribution of Institutions Reporting Changes in Numbers of Graduate Students, Postdoctorate Trainees, and Faculty Between Fall 1980 and Fall 1982 by Organization of Primary Neuroscience Training Program

Item	Total Percent	No Change	Net Increase	Net Decrease
		Type A (N=5)		
Graduate students	100	20	20	60
Postdoctorate trainees	100	20	40	40
Faculty	100	60	40	0
		Type B (N=21)		
Graduate students	100	19	43	38
Postdoctorate trainees	100	48	29	24
Faculty	100	43	48	10
		Type C (N=38)		
Graduate students	100	37	39	24
Postdoctorate trainees	100	58	24	18
Faculty	100	50	39	11
		Type D (N=108)		
Graduate students	100	31	34	34
Postdoctorate trainees	100	66	18	15
Faculty	100	61	29	10
		Type E (N=16)		
Graduate students	100	50	12	38
Postdoctorate trainees	100	75	12	12
Faculty	100	88	12	0

Type A: Department of neuroscience, Ph.D. in neuroscience
Type B: Interdepartmental program, Ph.D. in neuroscience
Type C: Interdepartmental program, Ph.D. in traditional discipline with specialization in neuroscience
Type D: Traditional department, Ph.D. in traditional discipline with specialization in neuroscience
Type E: Other

Table 18

Primary Factor for Net Change in Number of Graduate Students, Postdoctorate Trainees, and Faculty Between Fall 1980 and Fall 1982 All Institutions

(in percentages)

Primary Factor	Institutions Reporting Net Change: Increase	Decrease
Graduate Students		
Federal training grant support	3	23
Federal research grant support	9	8
Institutional/state support	12	3
Number of applicants	25	26
Quality of applicants	9	18
Professional interest	23	6
Demand for graduates	5	6
Other	14	10
Total percent	100	100
(Total number)	(65)	(62)
Postdoctorate Trainees		
Federal training grant support	25	33
Federal research grant support	22	33
Institutional/state support	8	0
Number of applicants	15	15
Quality of applicants	5	3
Professional interest	10	3
Demand for graduates	0	0
Other	15	12
Total percent	100	100
(Total number)	(40)	(33)
Faculty		
Federal training grant support	2	0
Federal research grant support	3	12
Institutional/state support	29	6
Number of applicants	0	0
Quality of applicants	3	6
Professional interest	29	6
Demand for graduates	2	0
Other	31	71
Total percent	100	100
(Total number)	(58)	(17)

Table 19

Foreign Full-Time Graduate Students and Postdoctorate Trainees, Fall 1981
by Selected Institutional Characteristics

Characteristics	Foreign Graduate Students		Foreign Postdoctorate Trainees	
	Number	As a % of Total Graduate Students	Number	As a % of Total Postdoctorate Trainees
Total institutions	221	9	254	20
Control of Institution				
Public	155	8	174	21
Private	66	9	80	17
Type of Institution				
Graduate school only	111	9	53	22
Medical school only	30	10	62	21
Comprehensive	80	8	139	18
Federally Funded R & D Expenditures in the Biological Sciences in 1980				
Top 50	89	8	168	20
All other	134	9	88	19
Organization of Primary Neuroscience Training Program				
Department of neuroscience	4	5	7	18
Interdepartmental program, neuroscience Ph.D.	32	8	103	22
Interdepartmental program, traditional Ph.D.	61	10	28	20
Traditional program	114	9	103	18
Other	9	6	12	17

Table 20

Principal Areas of Concentration in Training and Research of Graduate Students, Postdoctorate Trainees, and Faculty in Neuroscience Programs Since 1977, by Control of Institution

(in percentages)

Area	Graduate Student Training	Postdoctorate Training/ Research	Faculty Research
		Total (N=188)	
Anatomy	18	17	18
Biology	4	3	3
Biostatistics/mathematics	*	0	*
Biophysics	2	3	2
Bioengineering	2	1	1
Cell biology/microbiology	2	2	2
Clinical/medical sciences	1	2	2
Chemistry/biochemistry	6	9	7
Epidemiology/public health	0	0	0
Genetics	1	1	1
Pathology/toxicology	1	0	1
Pharmacology	12	16	14
Physiology	24	26	24
Psychology/behavioral sciences	21	11	18
Zoology	2	1	1
Other	2	3	2
Combination of above	4	5	5
Total percent	100	100	100
		Public (N=125)	
Anatomy	18	18	17
Biology	3	3	3
Biostatistics/mathematics	*	0	*
Biophysics	1	3	2
Bioengineering	1	*	1
Cell biology/microbiology	2	1	1
Clinical/medical sciences	1	1	2
Chemistry/biochemistry	6	9	7
Epidemiology/public health	0	0	0
Genetics	*	1	*
Pathology/toxicology	1	0	1
Pharmacology	12	17	14
Physiology	25	28	27
Psychology/behavioral sciences	24	12	20
Zoology	2	1	1
Other	*	2	1
Combination of above	3	4	3
Total percent	100	100	100
		Private (N=63)	
Anatomy	19	15	19
Biology	6	3	4
Biostatistics/mathematics	1	0	*
Biophysics	3	3	3
Bioengineering	2	3	2
Cell biology/microbiology	2	2	3
Clinical/medical sciences	1	3	1
Chemistry/biochemistry	5	10	6
Epidemiology/public health	0	0	0
Genetics	1	1	1
Pathology/toxicology	1	0	*
Pharmacology	11	14	12
Physiology	20	22	18
Psychology/behavioral sciences	16	11	15
Zoology	1	1	1
Other	4	4	4
Combination of above	7	7	9
Total percent	100	100	100

Note: Institutions reported three major areas of concentration. First-ranked areas were weighted by a factor of 3, second-ranked by a factor of 2, and third-ranked by a factor of 1. The above distributions reflect the weighted aggregation.

*Less than .5 percent.

Table 21

Principal Areas of Concentration in Training and Research of Graduate Students, Postdoctorate Trainees, and Faculty in Neuroscience Programs Since 1977, by Type of Institution

(in percentages)

Area	Graduate Student Training	Postdoctorate Training/ Research	Faculty Research
		Graduate School Only (N=90)	
Anatomy	11	15	11
Biology	5	4	3
Biostatistics/mathematics	*	0	*
Biophysics	2	3	2
Bioengineering	2	2	2
Cell biology/microbiology	3	3	2
Clinical/medical sciences	2	0	2
Chemistry/biochemistry	4	5	5
Epidemiology/public health	0	0	0
Genetics	1	2	1
Pathology/toxicology	1	0	1
Pharmacology	8	12	12
Physiology	23	27	25
Psychology/behavioral sciences	30	17	28
Zoology	2	0	1
Other	1	2	*
Combination of above	4	8	4
Total percent	100	100	100
		Medical School Only (N=37)	
Anatomy	30	19	28
Biology	3	1	1
Biostatistics/mathematics	0	0	0
Biophysics	1	3	2
Bioengineering	1	0	0
Cell biology/microbiology	2	2	3
Clinical/medical sciences	1	4	1
Chemistry/biochemistry	6	10	8
Epidemiology/public health	0	0	0
Genetics	0	0	0
Pathology/toxicology	1	0	1
Pharmacology	19	21	18
Physiology	24	26	20
Psychology/behavioral sciences	8	6	8
Zoology	0	0	0
Other	3	3	4
Combination of above	4	5	7
Total percent	100	100	100
		Comprehensive (N=61)	
Anatomy	22	17	21
Biology	4	2	5
Biostatistics/mathematics	1	0	*
Biophysics	2	2	2
Bioengineering	1	2	*
Cell biology/microbiology	0	1	0
Clinical/medical sciences	1	2	2
Chemistry/biochemistry	8	13	10
Epidemiology/public health	0	0	0
Genetics	0	1	0
Pathology/toxicology	*	0	0
Pharmacology	12	16	14
Physiology	24	25	25
Psychology/behavioral sciences	17	10	12
Zoology	1	2	2
Other	3	3	3
Combination of above	5	3	6
Total percent	100	100	100

Note: Institutions reported three major areas of concentration. First-ranked areas were weighted by a factor of 3, second-ranked by a factor of 2, and third-ranked by a factor of 1. The above distributions reflect the weighted aggregation.

*Less than .5 percent.

Table 22

Principal Areas of Concentration in Training and Research of Graduate Students, Postdoctorate Trainees, and Faculty in Neuroscience Programs Since 1977, by Federally Financed R & D Expenditures in the Biological Sciences in 1980

(in percentages)

Area	Graduate Student Training	Postdoctorate Training/ Research	Faculty Research
		Top 50	
Anatomy	19	18	20
Biology	5	4	5
Biostatistics/mathematics	0	0	0
Biophysics	2	2	2
Bioengineering	2	1	1
Cell biology/microbiology	1	1	2
Clinical/medical sciences	0	1	1
Chemistry/biochemistry	5	9	6
Epidemiology/public health	0	0	0
Genetics	0	0	0
Pathology/toxicology	0	0	0
Pharmacology	12	17	13
Physiology	25	24	24
Psychology/behavioral sciences	17	11	15
Zoology	1	0	1
Other	4	5	4
Combination of above	8	6	5
Total percent	100	100	100
		All Other (N=138)	
Anatomy	18	16	17
Biology	4	2	2
Biostatistics/mathematics	1	0	*
Biophysics	1	3	2
Bioengineering	2	1	1
Cell biology/microbiology	2	2	2
Clinical/medical sciences	2	2	2
Chemistry/biochemistry	6	9	7
Epidemiology/public health	0	0	0
Genetics	1	1	1
Pathology/toxicology	1	0	1
Pharmacology	12	15	14
Physiology	23	27	24
Psychology/behavioral sciences	23	12	20
Zoology	2	2	1
Other	1	2	1
Combination of above	3	5	5
Total percent	100	100	100

Note: Institutions reported three major areas of concentration. First-ranked areas were weighted by a factor of 3, second-ranked by a factor of 2, and third-ranked by a factor of 1. The above distributions reflect the weighted aggregation.

*Less than .5 percent.

Table 23

Principal Areas of Concentration in Training and Research of Graduate Students, Postdoctorate Trainees, and Faculty in Neuroscience Programs Since 1977, by Organization of Primary Neuroscience Training Program

(in percentages)

Area	Graduate Student Training	Postdoctorate Training/ Research	Faculty Research
		Type A (N=5)	
Anatomy	12	17	17
Biology	0	0	0
Biostatistics/mathematics	0	0	0
Biophysics	0	8	4
Bioengineering	0	0	0
Cell biology/microbiology	0	0	0
Clinical/medical sciences	0	0	0
Chemistry/biochemistry	29	29	25
Epidemiology/public health	0	0	0
Genetics	0	0	0
Pathology/toxicology	0	0	0
Pharmacology	0	0	0
Physiology	33	20	28
Psychology/behavioral sciences	0	0	0
Zoology	0	0	0
Other	26	26	26
Combination of above	0	0	0
Total percent	100	100	100
		Type B (N=21)	
Anatomy	22	22	21
Biology	7	5	6
Biostatistics/mathematics	0	0	0
Biophysics	2	4	4
Bioengineering	0	0	0
Cell biology/microbiology	2	1	2
Clinical/medical sciences	0	3	0
Chemistry/biochemistry	8	9	11
Epidemiology/public health	0	0	0
Genetics	0	0	0
Pathology/toxicology	0	0	0
Pharmacology	10	10	6
Physiology	28	28	28
Psychology/behavioral sciences	10	6	13
Zoology	0	0	0
Other	4	4	4
Combination of above	6	7	5
Total percent	100	100	100
		Type C (N=38)	
Anatomy	18	19	15
Biology	3	4	2
Biostatistics/mathematics	0	0	0
Biophysics	1	0	1
Bioengineering	3	3	2
Cell biology/microbiology	3	6	2
Clinical/medical sciences	2	0	2
Chemistry/biochemistry	6	8	7
Epidemiology/public health	0	0	0
Genetics	3	4	3
Pathology/toxicology	1	0	0
Pharmacology	10	14	14
Physiology	23	24	26
Psychology/behavioral sciences	24	14	23
Zoology	1	0	1
Other	2	4	2
Combination of above	1	2	1
Total percent	100	100	100

Continued

Table 23 (Continued)

Principal Areas of Concentration in Training and Research of Graduate Students, Postdoctorate Trainees, and Faculty in Neuroscience Programs Since 1977, by Organization of Primary Neuroscience Training Program

(in percentages)

Area	Graduate Student Training	Postdoctorate Training/ Research	Faculty Research
		Type D (N=108)	
Anatomy	19	16	19
Biology	4	2	3
Biostatistics/mathematics	1	0	*
Biophysics	2	4	2
Bioengineering	1	1	1
Cell biology/microbiology	2	1	2
Clinical/medical sciences	1	2	2
Chemistry/biochemistry	4	8	6
Epidemiology/public health	0	0	0
Genetics	*	0	*
Pathology/toxicology	1	0	1
Pharmacology	13	20	16
Physiology	23	28	23
Psychology/behavioral sciences	22	11	18
Zoology	2	1	1
Other	1	1	1
Combination of above	5	6	6
Total percent	100	100	100
		Type E (N=16)	
Anatomy	8	13	12
Biology	3	4	3
Biostatistics/mathematics	1	0	1
Biophysics	1	0	0
Bioengineering	4	0	4
Cell biology/microbiology	0	0	2
Clinical/medical sciences	4	4	4
Chemistry/biochemistry	3	10	5
Epidemiology/public health	0	0	0
Genetics	0	0	0
Pathology/toxicology	0	0	0
Pharmacology	8	14	13
Physiology	19	20	17
Psychology/behavioral sciences	35	19	25
Zoology	3	5	4
Other	1	2	1
Combination of above	9	10	9
Total percent	100	100	100

Type A: Department of neuroscience, Ph.D in neuroscience
Type B: Interdepartmental program, Ph.D. in neuroscience
Type C: Interdepartmental program, Ph.D. in traditional discipline with specialization in neuroscience
Type D: Traditional department, Ph.D. in traditional discipline with specialization in neuroscience
Type E: Other

Note: Institutions reported three major areas of concentration. First-ranked areas were weighted by a factor of 3, second-ranked by a factor of 2, and third-ranked by a factor of 1. The above distributions reflect the weighted aggregation.

*Less than .5 percent.

Table 24

Number of Ph.D. Recipients in Neuroscience Programs, by Selected Institutional Characteristics

Characteristic	Academic Year 1980-81	1981-82	1982-83
Total	516	490	599
Control of Institution			
Public	340	335	410
Private	176	155	189
Type of Institution			
Graduate school only	216	204	264
Medical school only	69	79	88
Comprehensive	231	207	247
Federally Funded R & D Expenditures in the Biological Sciences in 1980*			
Top 50	263	232	272
All other	262	263	335
Organization of Primary Neuroscience Training Program			
Department of neuroscience	20	12	16
Interdepartmental program, neuroscience Ph.D.	84	85	98
Interdepartmental program, traditional Ph.D	116	102	118
Traditional program	265	267	329
Other	31	25	38

*Data from the top 50 and all other institutions were weighted separately and therefore may not add exactly to the total for all institutions.

Table 25

Typical Length of Full-Time Study and Training for Graduate Students and Postdoctorate Trainees Who Completed Neuroscience Programs During AY 1980-81, All Institutions

(in percentages)

Length of Time	Total
Graduate students	
Three years or less	2
Four years	28
Five years	63
Six years	5
Seven years	2
Eight years or more	0
Total percent	100
(Total number)	(N=175)*
Postdoctorate trainees	
One year or less	7
Two years	65
Three years	26
Four years or more	2
Total percent	100
(Total number)	(N=124)*

*The number of institutions represented on this table is lower than the population because some neuroscience programs began too recently for graduate students or postdoctorate trainees to have completed their study or training periods. Further, not all institutions provided postdoctorate training.

Table 26

Change Since 1977 in the Typical Length of Full-Time Study and Training for Graduate Students and Postdoctorate Trainees in Neuroscience Programs, All Institutions

(in percentages)

Change Reported	Graduate Study Period	Postdoctorate Training Period
No change	85	72
Decrease	3	5
Increase of less than one year	5	10
Increase of one year or more	6	14
Total percent	100	100
(Total number)	(N=175)*	(N=124)*
Primary factor for increase in study or training period:		
Lack of postdoctorate training opportunities/full-time jobs in the field	33	69
Expansion of curricula or training program requirements	28	3
Professional need/interest for additional training and specialization	29	21
Availability of stipend/salary support	5	3
Other	5	3
Total percent	100	100
(Total number)	(N=21)	(N=29)

*The number of institutions represented on this table is lower than the population because some neuroscience programs began too recently for graduate students or postdoctorate trainees to have completed their study or training periods. Further, not all institutions provided postdoctorate training.

Table 27

Opinions About Market for Postdoctorate Training and Full-Time Employment in Neuroscience, AY 1981-82
by Control of Institution

(in percentages)

Market	Postdoctorate Training	Full-Time Employment
	Total	
Critical shortage of personnel	5	0
Moderate shortage of personnel	21	7
Market balance	41	18
Moderate surplus of personnel	29	56
Critical surplus of personnel	4	19
Total percent	100	100
(Total number)*	(180)	(181)
	Public	
Critical shortage of personnel	4	0
Moderate shortage of personnel	22	6
Market balance	39	20
Moderate surplus of personnel	32	56
Critical surplus of personnel	4	18
Total percent	100	100
(Total number)*	(121)	(121)
	Private	
Critical shortage of personnel	8	0
Moderate shortage of personnel	17	8
Market balance	46	13
Moderate surplus of personnel	24	57
Critical surplus of personnel	5	22
Total percent	100	100
(Total number)*	(59)	(60)

*The numbers of institutions represented here are lower than the population numbers because not all institutions answered the questions.

Table 28

Opinions About Market for Postdoctorate Training and Full-Time Employment in Neuroscience, AY 1981-82
by Type of Institution

(in percentages)

Market	Postdoctorate Training	Full-Time Employment
	Graduate School Only	
Critical shortage of personnel	4	0
Moderate shortage of personnel	22	4
Market balance	39	25
Moderate surplus of personnel	30	51
Critical surplus of personnel	5	20
Total percent	100	100
(Total number)*	(84)	(84)
	Medical School Only	
Critical shortage of personnel	11	0
Moderate shortage of personnel	23	12
Market balance	37	12
Moderate surplus of personnel	23	61
Critical surplus of personnel	6	15
Total percent	100	100
(Total number)*	(35)	(36)
	Comprehensive	
Critical shortage of personnel	2	0
Moderate shortage of personnel	16	8
Market balance	48	13
Moderate surplus of personnel	33	59
Critical surplus of personnel	2	21
Total percent	100	100
(Total number)	(61)	(61)

*The numbers of institutions represented here are lower than the population numbers because not all institutions answered the questions.

Table 29

Opinions About Market for Postdoctorate Training and Full-Time Employment in Neuroscience, AY 1981-82
by Federally Financed R & D Expenditures in the Biological Sciences in 1980

(in percentages)

Market	Postdoctorate Training	Full-Time Employment
	Top 50	
Critical shortage of personnel	5	0
Moderate shortage of personnel	18	4
Market balance	42	20
Moderate surplus of personnel	35	61
Critical surplus of personnel	0	14
Total percent	100	100
(Total number)*	(49)	(49)
	All Other	
Critical shortage of personnel	5	0
Moderate shortage of personnel	21	8
Market balance	40	18
Moderate surplus of personnel	27	54
Critical surplus of personnel	6	21
Total percent	100	100
(Total number)*	(131)	(132)

*The numbers of institutions represented here are lower than the population numbers because not all institutions answered the questions.

Table 30

Opinions About Market for Postdoctorate Training and Full-Time Employment in Neuroscience, AY 1981-82
by Organization of Primary Neuroscience Training Program

(in percentages)

Market	Postdoctorate Training	Full-Time Employment
	Type A	
Critical shortage of personnel	0	0
Moderate shortage of personnel	25	0
Market balance	25	25
Moderate surplus of personnel	50	50
Critical surplus of personnel	0	25
Total percent	100	100
(Total number)*	(4)	(4)
	Type B	
Critical shortage of personnel	5	0
Moderate shortage of personnel	33	10
Market balance	38	10
Moderate surplus of personnel	24	70
Critical surplus of personnel	0	10
Total percent	100	100
(Total number)*	(21)	(20)
	Type C	
Critical shortage of personnel	6	0
Moderate shortage of personnel	25	0
Market balance	42	22
Moderate surplus of personnel	22	61
Critical surplus of personnel	6	17
Total percent	100	100
(Total number)	(36)	(36)
	Type D	
Critical shortage of personnel	5	0
Moderate shortage of personnel	16	8
Market balance	43	19
Moderate surplus of personnel	30	52
Critical surplus of personnel	5	21
Total percent	100	100
(Total number)*	(103)	(104)
	Type E	
Critical shortage of personnel	0	0
Moderate shortage of personnel	19	18
Market balance	31	6
Moderate surplus of personnel	50	53
Critical surplus of personnel	0	24
Total percent	100	100
(Total number)*	(16)	(17)

Type A: Department of neuroscience, Ph.D. in neuroscience
Type B: Interdepartmental program, Ph.D. in neuroscience
Type C: Interdepartmental program, Ph.D. in traditional discipline with specialization in neuroscience
Type D: Traditional department, Ph.D. in traditional discipline with specialization in neuroscience
Type E: Other

*The numbers of institutions represented here are lower than the population numbers because not all institutions answered the questions.

Appendix A: Survey Instrument

AMERICAN COUNCIL ON EDUCATION
ONE DUPONT CIRCLE
WASHINGTON, D. C. 20036

June 21, 1982

HIGHER EDUCATION PANEL
(202) 833-4757

Dear Higher Education Panel Representative,

Attached is Higher Education Panel Survey #57, "Neuroscience Personnel and Training." Sponsored by the National Science Foundation, its purpose is to clarify some aspects of current neuroscience training and manpower.

Research on the nervous system has grown very rapidly over the past decade with large increases in the number of scientists working in this area. Formal and informal training programs in neuroscience have proliferated in colleges and universities, and nearly 200 neuroscience training programs have been identified. Unfortunately, this explosive growth has not been accompanied by specific information regarding neuroscientists and their training, or the manpower needs and capabilities in the neurosciences. Most neuroscientists, because of the interdisciplinary nature of their research, are based in departments of anatomy, pharmacology, physiology, biochemistry, biology, and psychology; there are only one dozen formal departments of neuroscience. Thus, the status of manpower and training in neuroscience cannot be assessed by simply studying conventional departments.

You will note that this is a somewhat complex questionnaire and will require very specific, substantive knowledge of the discipline to complete. Consequently, instead of asking the HEP representative to determine the most appropriate respondent, the Foundation has requested that a specific individual act as neuroscience coordinator on your campus. At your institution, the Foundation recommends that the survey be forwarded to:

If this person is no longer on your campus or is otherwise unavailable to act as coordinator, please designate an appropriate substitute and let us know whom you select. We have included a preaddressed postcard for this purpose.

Please understand that your institution's response will be protected to the maximum extent permissible by law. As with all our surveys, the data you provide will be reported in summary fashion only and will not be identifiable with your institution. This survey is authorized by the National Science Foundation Act of 1950, as amended. Although you are not required to respond, your cooperation is needed to make the results comprehensive, reliable, and timely.

Please have the completed questionnaire returned to us by July 12, 1982. A preaddressed envelope is enclosed for your convenience. If you have any questions or problems, please do not hesitate to telephone us collect at (202)833-4757.

Sincerely,

Frank J. Atelsek

Frank J. Atelsek
Panel Director

Enclosures

NATIONAL SCIENCE FOUNDATION
WASHINGTON, D.C. 20550

June 21, 1982

Dear Neuroscience Coordinator:

We are writing to ask your cooperation with the attached survey which we are sponsoring to clarify some aspects of current neuroscience training and manpower. We at the National Science Foundation have asked the Higher Education Panel, a survey research program operated by the American Council on Education, to conduct this survey for us.

Research on the nervous system has grown rapidly in the past decade, yet there has been no concomitant growth in information about neuroscientists. There are only about twelve formal departments of neuroscience around the country, and many neuroscientists and much training are based in traditional departments of anatomy, biochemistry, biology, pharmacology, physiology, and psychology. Since most of the data relative to training and manpower is compiled on the department level, information relevant to neuroscience training—which cuts across traditional department lines—is not available.

Accurate and specific information on neuroscience is needed by the National Science Foundation both to help determine policy and to evaluate the impact of changes in research and training support. These data will be useful, in addition, to other federal agencies, the Society for Neuroscience, and the federal Interagency Working Group in Neuroscience.

We realize that this is a very difficult questionnaire and several of the items will require a substantial effort. However, we hope you will agree that the goal is worth the effort.

It is especially important that you think carefully about the first question in the survey because it defines the neuroscience program at your institution. The rest of the survey relates to the neuroscience program you define, and we encourage you to be as comprehensive as possible. For example, even if your institution has a department of neuroscience or an interdepartmental program with a doctorate in neuroscience, neuroscience graduate students, postdoctorate trainees, and faculty may be housed in several departments. It is important for the survey to include *all* appropriate persons, not just those associated with a formal neuroscience department or program. If there is a medical school on your campus, be sure to consider its students, faculty, and staff. We ask that you be inclusive rather than exclusive in your responses.

Please feel free to call the Higher Education Panel staff collect at (202) 833-4757 if there are any questions or problems. This survey should be returned by July 12, 1982 to the Higher Education Panel, One Dupont Circle, Suite 829, Washington, D.C. 20036.

Your best efforts will be sincerely appreciated.

Jim Brown

James H. Brown
Division of Behavioral and
Neural Sciences
National Science Foundation

Joe Coulter

Joe Dan Coulter
Education Committee
Society for Neuroscience

AMERICAN COUNCIL ON EDUCATION

OMB #3145-0009
exp. 6/30/84

Higher Education Panel Survey No. 57

NEUROSCIENCE PERSONNEL AND TRAINING

Definitions

Neuroscience: Those subject areas, disciplines and research strategies which have, as a primary goal, the understanding of the structure and function of nervous systems and the role of the nervous system in determining behavior.

Graduate student (full-time): An individual enrolled full-time in a program of study/training leading to a Ph.D. or equivalent. *Exclude* students enrolled solely in a medical program, but *include* students in dual degree programs (e.g., M.D.-Ph.D.)

Postdoctorate trainee: An individual with a doctorate (Ph.D., Sc.D., etc.) *or* with a professional degree (M.D., D.D.S., D.V.M., etc.) who, under *temporary appointment*, devotes full-time to research activities or study, usually for a specified time period.

Nonfaculty research doctorate: A person employed full-time by the department in a professional capacity specifically for research activities who holds a doctorate, who *does not* have a faculty appointment and *is not* a postdoctorate trainee.

Faculty: Individuals with regular, full-time faculty appointments (both tenured and nontenured). Exclude postdoctorate trainees and nonfaculty research doctorates.

1. Indicate the primary administrative/organizational structure that in academic year 1981-82 provides graduate neuroscience training at your institution. If such training is provided by more than one administrative/organizational structure, enter the appropriate codes in the spaces provided.

STRUCTURE *(Enter codes from list opposite.)*	
Primary neuroscience training program	_____
Additional neuroscience training programs (if any)	_____

CODES

A Department of Neuroscience, Ph.D. in neuroscience
B Interdepartmental program, Ph.D. in neuroscience
C Interdepartmental program, Ph.D. in traditional discipline with specialization in neuroscience
D Traditional department, Ph.D. in traditional discipline with specialization in neuroscience
E Other (specify) _____

Please complete the rest of this questionnaire with reference to all graduate neuroscience personnel and training at your institution—i.e., the primary neuroscience program and all additional neuroscience training.

2. As of fall 1981, how many full-time faculty and full-time nonfaculty research doctorates were in your neuroscience program(s)? *Do not* include postdoctorate trainee positions.

NUMBER

_____ All faculty

(_____) Tenured faculty

(_____) Nontenured faculty

_____ Nonfaculty research doctorates

3. How many full-time graduate students, postdoctorate trainees, and faculty were in your neuroscience program(s) in fall 1980 and 1981, and what are your estimates for fall 1982? (Please provide your best estimates if actual counts are not available.)

	GRADUATE STUDENTS	POSTDOCTORATE TRAINEES	FACULTY
Fall 1980	_____	_____	_____
Fall 1981	_____	_____	_____
Fall 1982 (estimate)	_____	_____	_____

This figure should be the same as that reported for all faculty in item 2 above.

4. If any *net changes* (either increases or decreases) occurred between fall 1980 and fall 1982 in the number of graduate students, postdoctorate trainees, or faculty in your neuroscience program(s) (as indicated above in question 3), please indicate for each the *primary factor* that contributed to that change.

PRIMARY FACTOR FOR CHANGE *(Enter codes from list opposite)*	
Graduate students	_____
Postdoctorate trainees	_____
Faculty	_____

CODE

Change in:

A Federal training grant/fellowship support
B Federal research grant/contract support
C Institutional/state support
D Number of applicants
E Quality of applicants
F Professional interest in the field
G Demand for graduates/availability of jobs in the field
H Other (specify) _____
I No net change

5. How many Ph.D.s were awarded in your neuroscience program(s) in academic years 1980-81 and 1981-82, and what is your estimate for academic year 1982-83? (Please provide your best estimates if actual counts are not available.)

	PH.D. RECIPIENTS
Academic Year 1980-81	_____
Academic Year 1981-82	_____
Academic Year 1982-83 (estimate)	_____

6. In fall 1981, how many full-time graduate students and postdoctorate trainees in your neuroscience program(s) were foreign (non-U.S.) citizens on temporary or student visas?

	NUMBER
Foreign graduate students	_____
Foreign postdoctorate trainees	_____

7. Indicate the three major subject areas/disciplines that best characterize the areas of concentration in training and research of graduate students, postdoctorate trainees, and faculty in your neuroscience program(s) within the past five years (since 1977). Rank order the top three areas for each group, with (1) being the area of greatest concentration.

	MAJOR AREAS OF CONCENTRATION *(Enter codes from list below.)*		
Graduate student training	(1) _____	(2) _____	(3) _____
Postdoctorate training/research	(1) _____	(2) _____	(3) _____
Faculty research	(1) _____	(2) _____	(3) _____

CODE

A Anatomy
B Biology
C Biostatistics/mathematics
D Biophysics
E Bioengineering
F Cell biology/microbiology
G Clinical/medical sciences
H Chemistry/biochemistry
I Epidemiology/public health
J Genetics
K Pathology/toxicology
L Pharmacology
M Physiology
N Psychology/behavioral sciences
O Zoology
P Other (specify) _____

8. What was the average or typical number of years of full-time study and training for graduate students and postdoctorate trainees who completed your neuroscience program(s) during academic year 1980-81?

GRADUATE STUDENTS
(Check One)

( ) Three years or less
( ) Four years
( ) Five years
( ) Six years
( ) Seven years
( ) Eight years or more

POSTDOCTORATE TRAINEES
(Check One)

( ) One year or less
( ) Two years
( ) Three years
( ) Four years or more

9. In the past five years (since 1977), has there been a change in the average or typical number of years of full-time study and training for graduate students and postdoctorate trainees in your neuroscience program(s)?

GRADUATE STUDY PERIOD
(Check One)

( ) Decreased
( ) No change
( ) Increased less than one year
( ) Increased one year or more

POSTDOCTORATE TRAINING PERIOD
(Check One)

( ) Decreased
( ) No change
( ) Increased less than one year
( ) Increased one year or more

10. **If an increase has occurred** in the average amount of time either your graduate students or postdoctorate trainees remain in your neuroscience program (as indicated above in question 9), to which primary factor do you attribute the increase(s)?

PRIMARY FACTOR FOR INCREASE
(Enter codes from list opposite.)

Graduate students _____

Postdoctorate trainees _____

CODE

A Lack of postdoctorate training opportunities/full-time jobs in the field
B Expansion of curricula or training program requirements
C Professional need/interest for additional training and specialization
D Availability of stipend/salary support
E Other (specify) _____

11. In fall 1981, how many full-time faculty vacancies (budgeted positions) existed in your neuroscience program(s)?

_____ Faculty vacancies fall 1981

12. Of the faculty employed full-time in fall 1981 in your neuroscience program(s), how many do you expect will retire after spring term 1982 and before fall term 1983 (a one-year span)?

_____ Expected retirements 1982-83

13. From your recent placement experience, how would you characterize the market during academic year 1981-82 for *postdoctorate training* in neuroscience and *full-time employment* in neuroscience following completion of postdoctorate training?

MARKET
(Enter codes from list opposite.)

Postdoctorate training _____

Full-time employment _____

CODE

A Critical shortage of personnel
B Moderate shortage of personnel
C Market balance between personnel and positions
D Moderate surplus of personnel
E Critical surplus of personnel

Thank you for your assistance. Please return this form by **July 12, 1982** to:

Higher Education Panel
American Council on Education
One Dupont Circle, Suite 829
Washington, D.C. 20036

Please keep a copy of this survey for your records.
Person completing form:

Name _____

Dept. _____

Phone _____

If you have any questions or problems, please call the HEP staff collect at (202) 833-4757

Appendix B: Technical Notes

The survey instrument was sent to all colleges and universities that offered doctorate-level programs in the neurosciences: 181 Panel institutions and 7 nonpanel institutions. Thus, unlike most Panel surveys, standard errors are not reported since the data were drawn from the entire population of institutions identified as offering neuroscience training.

Weighting

Data from the 174 responding institutions were statistically adjusted to represent the population of institutions with graduate neuroscience activity.

First, data were imputed for unreported items using cell averages. Then weights were calculated for each cell by dividing the number of institutions in the population by the number of institutions that responded (see table B-1). The resulting weights then were applied to the data provided by each institution, thus raising the respondent data to national estimates.

Table B-1: Stratification Design for Weighting

Cell	Description	Population	Respondents	Weight
01	Public universities	85	79	1.08
02	Private universities	47	40	1.18
03	Public medical schools	25	24	1.04
05	Public nonblack four-year colleges (large)	14	14	1.00
06	Private medical schools	13	13	1.00
07	Private four-year colleges (large)	1	1	1.00
10	Public four-year colleges (small)	1	1	1.00
11	Private four-year colleges (medium)	1	1	1.00
12	Private four-year colleges (small)	1	1	1.00

Response Analysis

Table B-2 compares the 174 respondents with the 14 nonrespondents against several institutional characteristics. The overall response rate was quite high--93 percent--and the rates for different kinds of institutions never fell more than 4 percentage points below that norm.

Higher-than-average response rates were recorded for medical schools (97 percent), four-year colleges (98 percent), and institutions enrolling 1,200-2,500 graduate and first professional students (98 percent).

Lower-than-average response rates were recorded for the largest graduate schools (88 percent) and for private institutions (89 percent).

Table B-2: Comparison of Respondents and Nonrespondents

Characteristic	Respondents (N=174)	Nonrespondents (N=14)	Response Rate
Total	100.0	100.0	92.6
Control			
Public	67.8	50.0	94.4
Private	32.2	50.0	88.9
Type			
University	68.4	92.9	90.2
Four-year college	31.6	7.1	98.2
Carnegie Class			
Research university	44.8	57.2	90.7
Doctoral-granting	25.3	28.6	91.7
Comprehensive	7.5	7.1	92.9
Medical school	20.7	7.1	97.3
All other	1.7	0.0	100.0
Census Region			
East	26.4	21.4	93.6
Midwest	22.4	28.6	90.7
South	33.9	28.6	93.7
West	17.2	21.4	90.9
Graduate & First Professional Enrollment			
Less than 1,200	24.7	14.3	95.6
1,200-2,500	23.0	7.1	97.6
2,501-4,500	25.9	35.7	90.0
4,501 or more	26.4	42.9	88.5

Other Reports of the Higher Education Panel
American Council on Education

Atelsek, Frank J. and Gomberg, Irene L. **Nonfederal Funding of Biomedical Research and Development: A Survey of Doctoral Institutions.** Higher Education Panel Report, No. 25, July 1975.

Gomberg, Irene L. and Atelsek, Frank J. **Major Field Enrollment of Junior-Year Students, 1973 and 1974.** Higher Education Panel Report No. 26, April 1976.

Atelsek, Frank J. and Gomberg, Irene L. **Student Assistance: Participants and Programs, 1974-75.** Higher Education Panel Report No. 27, July, 1975.

Atelsek, Frank J. and Gomberg, Irene L. **Health Research Facilities: A Survey of Doctorate-Granting Institutions.** Higher Education Panel Report, No. 28, February, 1976.

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